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Amendment and Response
Applicant: Michael R. Krause et al.
Serial No. 09/578,019
Filed: May 24, 2000
Docket No.: 10991834-2
Title: RELIABLE MULTICAST

REMARKS

The following remarks are made in response to the Office Action mailed September 8, 2006. Claims 1, 3-30, and 32-53 were rejected. With this Response, claims 1, 5-8, 29, and 34-37 have been amended. Claims 1, 3-30, and 32-53 remain pending in the application and are presented for reconsideration and allowance.

Objection to the Drawings and Claim Rejections under 35 U.S.C. § 112

The Examiner has objected the drawings under 37 C.F.R. 1.83(a). The drawings must show every feature of the invention specified in the claims.

The Examiner rejected claim 1, 3-30, and 32-53 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.

Amended independent claims 1 and 29 are clarified to recite "a predetermined percentage of destination AIs in the multicast group reliably" receives "each unit of work or a cumulative set of units of work in the first unit of work stream in the expected defined order." This language now clarifies that a percentage of destination application instances receives each unit of work or a cumulative set of units of work in the first unit of work stream in the expected defined order, such that the cumulative set of units of work can be every unit of work in the first unit of work stream.

Support in the present specification for unit of work completion processing is found at pages 39-41 and correspondingly illustrated in Figures 9 and 10. In addition, at page 32, beginning at line 11, the present specification states, "Each of the participating multicast destination device's CS generate an ACK for each unit of work it receives. The ACK can be cumulative or on a per unit of work basis." The present specification at page 32, beginning at line 19 further states, "CS 526 of device 502 gathers all of the acknowledgments (e.g., ACKs and NAKs) and completes the unit of work operation by informing source AI 510 of the operation status of a given unit of work multicast."

The specification at page 16, beginning at line 24 provides further definition as follows:

In one embodiment, ACKs are on a per unit of work basis. In this embodiment, a separate ACK is transmitted for each unit of work which is successfully received and processed by the destination SDR resources. In another embodiment, the ACKs are cumulative. In the cumulative ACK

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embodiment, for a given set of units of work, a single ACK is transmitted with the embedded SDR sequence number indicating that all units of work in the set of units of work up to and including the unit of work assigned the current SDR sequence number have been successfully received and processed by the destination SDR resources.

In view of the above, claims 1, 3-30, and 32-53 are believed to be in form for allowance. Therefore, Applicants respectfully request that objections to the drawings be removed and the rejections to these claims under 35 U.S.C. § 112, first paragraph, be reconsidered, and that the rejections be removed and these claims be allowed.

Claim Rejections under 35 U.S.C. § 103

The Examiner rejected claims 1, 3, 4, 9-11, 15, 16, 22, 29, 30, 32, 33, 41, 42, and 46 under 35 U.S.C. § 103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696 in view of the Nessett et al. U.S. Patent No. 5,968,176 in further view of the Van Loo et al. U.S. Patent No. 6,064,672 in further view of the Ruszczyk U.S. Patent No. 6,205,150.

The Examiner rejected claims 5-8, 18-20, 34-37, and 44 under 35 U.S.C. § 103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, and the Ruszczyk U.S. Patent No. 6,205,150, and in further view of the Block et al. U.S. Patent No. 6,192,417.

The Examiner rejected claims 12 and 38 under 35 U.S.C. § 103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, and the Ruszczyk U.S. Patent No. 6,205,150 in further view of the Hamilton et al. U.S. Patent No. 6,392,993.

The Examiner rejected claims 13, 14, 17, 39, 40, and 43 under 35 U.S.C. § 103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, and the Ruszczyk U.S. Patent No. 6,205,15, and in further view of the Muller et al. U.S. Patent No. 6,256,740.

The Examiner rejected claims 21 and 23 under 35 U.S.C. § 103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent

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No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, and the Ruszczyk U.S. Patent No. 6,205,150, and in further view of the VanDoren et al. U.S. Patent No. 6,279,084.

The Examiner rejected claims 24, 26, 27, 47, 51, and 52 under 35 U.S.C. § 103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, the Ruszczyk U.S. Patent No. 6,205,150, and the VanDoren et al. U.S. Patent No. 6,279,084, and in further view of the Hamilton U.S. Patent No. 6,392,993.

The Examiner rejected claims 25 and 48-50 under 35 U.S.C. § 103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, the Ruszczyk U.S. Patent No. 6,205,150, the VanDoren et al. U.S. Patent No. 6,279,084, the Hamilton U.S. Patent No. 6,392,993, and in further view of the Miller U.S. Patent No. 5,553,083.

The Examiner rejected claims 28 and 53 under 35 U.S.C. § 103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, and the Ruszczyk U.S. Patent No. 6,205,150, and in further view of the Mallory U.S. Patent No. 6,335,933.

The Examiner rejected claim 45 under 35 U.S.C. § 103(a) as being unpatentable over the Miller et al. U.S. Patent No. 6,151,696, the Nessett et al. U.S. Patent No. 5,968,176, the Van Loo et al. U.S. Patent No. 6,064,672, and the Block U.S. Patent No. 6,192,417 in further view of the VanDoren et al. U.S. Patent No. 6,279,084.

Amended independent claim 1 includes the limitations of the communication services (CS) in the source device correlating the independent reliable transport services and verifying that a predetermined percentage of destination application instances (AIs) in the multicast group reliably receives each unit of work or a cumulative set of units of work in the first unit of work stream in the expected defined order. Amended independent claim 29 includes the limitations of correlating the independent reliable transport services including verifying that a predetermined percentage of destination devices in the multicast group reliable has received each unit of work or a cumulative set of units of work in the first unit of work stream in the expected defined order. Amended independent claims 1 and 29 are not taught or suggested by the cited references alone or in combination.

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The Examiner admits that the Miller et al. patent does not teach the following limitations of independent claims 1 and 29: communication services/fabric providing communication between the source device and the multiple destination devices; guaranteeing strong ordering of the first unit of work stream received at the corresponding one of the multiple destination devices; first SDR resources at the source device having at least one queue configured to hold transmitted from the source device to the corresponding one of the multiple destination devices but not acknowledged units of work and not yet transmitted units of work; and second SDR resources at the corresponding one of the multiple destination devices having state information including an expected next sequence number value indicating an expected defined order corresponding to a next unit of work to be received; and independent reliable transport services.

As admitted by the Examiner, the Miller et al. patent does not teach independent reliable transport services. Therefore, the Miller et al. patent cannot teach correlating independent reliable transport services as recited in amended independent claims 1 and 29.

As admitted by the Examiner, the Miller et al. patent does not teach guaranteeing strong ordering of the first unit of work stream received at the corresponding one of the multiple destination devices. Therefore, the Miller et al. patent cannot teach verifying that a predetermined percentage of destination AIs in the multicast group reliable receives each unit of work or a cumulative set of units of work in the first unit of work stream in the expected defined order as recited in amended independent claims 1 and 29.

Furthermore, as indicated in the Examiner Interview Summary filed with the Amendment/Reply filed on June 9, 2006, and as further indicated in the Examiner Summary provided by Examiner England on May 15, 2006, in the telephonic Examiner Interview of May 8, 2006, Examiner England agreed that the Miller et al. patent teaches a threshold of number of allowed drop frames not a percentage of destination application instances that receive every unit in the first unit of work stream in the expected defined order as recited in the previous independent claims 1 and 29. The same reasoning for this distinction applies with the currently clarified language of amended independent claims 1 and 29, specifically that the Miller et al. patent teaches a threshold of a number of allowed drop frames not a percentage of destination application instances that receive each unit of work or a cumulative set of units of work in the first unit of work stream in the expected defined order. Thus,

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Applicants respectfully submit that the statement made in the Examiner Interview Summary provided by Examiner England on May 15, 2006 and in the telephone Examiner Interview of May 8, 2006 related to that amended independent claims 1 and 29 overcome the rejections based on the currently cited references including the Miller et al. patent still apply. In addition, as amended independent claims 1 and 29 as provided above clearly are supported by the specification and drawings and overcome the rejections based on the currently cited references including the Miller et al. patent, amended independent claims 1 and 29 are believed to be allowable. Applicants respectfully submit the additional following remarks to further support allowability of amended independent claims 1 and 29.

The Examiner cites the Van Loo et al. patent for teaching guaranteed strong ordering. The Miller et al. patent, however, teaches away from employing guaranteed strong ordering of the first unit of work stream received at the corresponding one of the multiple destination devices as recited in amended independent claims 1 and 29. First, at column 4, line 66-column 5, line 8, the Miller et al. patent specifically states,

If, after the entire file has been transmitted over the link 24, the negative acknowledgments indicate that certain frames need to be retransmitted over the link 24 (step 12), only those certain frames are retransmitted (step 14). As those certain frames are being retransmitted over the link 24, frame negative acknowledgments from one or more of the recipients 22 are received via the link 24 (step 14.) This process is then repeated as many times as necessary until no more frames need to be retransmitted.

Thus, a defined order provided by guaranteed strong ordering would not work with this scheme disclosed in the Miller et al. patent where the negative acknowledgments indicate that certain frames need to be retransmitted and only those certain frames are retransmitted.

Secondly, the Miller et al. patent, at column 11, line 39-column 12, line 4, further teaches away from guaranteeing strong ordering of the first unit of work stream received at the corresponding one of multiple destination devices. This section of the Miller et al. patent teaches that a group threshold parameter may be set by the user as the limit, expressed in percent of drop frames, by a particular client that is allowed for continuing participation in the multicast group. Such a threshold cannot be used with a guaranteed strong ordering of

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the first unit of work stream received at the corresponding one of multiple destination devices as recited in amended independent claims 1 and 29.

Furthermore, the Van Loo et al. patent teaches away from using strong ordering in a data processing system, such as, claimed in amended independent claim 1 or in a method of processing data, such as claimed in amended independent claim 29.

The Van Loo et al. patent discloses a reliable transport scheme in ringlet networks that employs strong sequential ordering (SSO). To achieve the SSO, the Van Loo et al. system employs certain characteristic features of ringlet networks. In particular, SSO is achieved by a source device in the ringlet indicating a sequence number in each transmitted packet, and the destination devices participating in the SSO scheme keeping track of the sequence numbers in the received packets such that an out-of-sequence packet is identifiable. If an error is identified, all packets received subsequently to the last good packet must be re-transmitted to the destination devices in the ringlet. Applicant respectfully points out relevant language in the Van Loo et al. patent beginning at col. 12, line 6, "Fundamental to the proposal is the assumption that *local ringlet transmission is unidirectional and bypasses no nodes*. . . [a ringlet employing an optional short cut routing feature] would not support SSO ordering."

Although the Van Loo et al. patent discloses the use of SSO for reliable transport, this reference teaches away from multiple SDRs, each SDR implementing an independent reliable transport service between the source device and a corresponding one of the multiple destination devices in the multicast group, as recited in amended independent claims 1 and 29. By contrast, the Van Loo et al. patent teaches essentially a singular transport service such that, as stated beginning at col. 13, line 64, "Once [an error] is detected at the producer node, the SSO state values maintained for this producerId at every node in the ringlet are in question. Each ringlet node's SSO state information for this producerID must be reset, without any change in either the SSO programming space for this producerId or for any other producer node."

The Examiner cites the Ruszczyk patent to teach the limitations of independent claims 1 and 29 of first SDR resources at the source device having at least one queue for holding transmitted from the source device to the corresponding one of the multiple destination devices but not acknowledged units of work and not yet transmitted units of work.

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Applicants, however, respectfully submit that these limitations are not taught or suggested by the Ruszczyk patent. Instead, the Ruszczyk patent teaches, beginning at column 4, line 47, and illustrated in Figure 2, that a first network device determines a scheduling priority for data packets in a first queue. The first network device inserts higher priority data packets into a second queue. The first network device inserts lower priority data packets into a third queue. The first network device schedules higher priority data packets in the second queue where data packets are transmitted as higher priority data packets. The first network device schedules lower priority data packets in the third queue with transmission deadlines where lower priority data packets are executed after higher priority data packets. The first network device promotes a lower priority data packet in the third queue to the second queue when a transmission deadline for the lower priority packet has expired. Thus, these first, second, and third queues disclosed in the Ruszczyk patent hold not yet transmitted units of work, but do not hold transmitted from the source device to the corresponding one of the multiple destination devices but not acknowledged units of work. Thus, the Ruszczyk patent does not teach or suggest first SDR resources at the source device having at least one queue for holding transmitted from the source device to the corresponding one of the multiple destination devices but not acknowledged units of work as recited in amended independent claims 1 and 29.

In view of the above, the Miller et al. patent, the Nessett et al. patent, the Van Loo et al. patent, and the Ruszczyk patent do not teach or suggest alone or in combination all of the limitations of amended independent claim 1 or all of the limitations of amended independent claim 29.

In addition, dependent claims 3-28 are allowable as depending from an allowable base claim (claim 1) and are allowable on further independent grounds in view of the novel and nonobvious features and combinations set forth therein. Dependent claims 30 and 32-53 are allowable as depending from an allowable base claim (claim 29) and are allowable on further independent grounds in view of the novel and nonobvious features and combinations set forth therein.

Therefore, Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. § 103(a) rejections to claims 1, 3-30, and 32-53, and request allowance of these claims.

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CONCLUSION

In view of the above, Applicant respectfully submits that pending claims 1, 3-30, and 32-53 are in form for allowance and are not taught or suggested by the cited references. Therefore, reconsideration and withdrawal of the rejections and allowance of claims 1, 3-30, and 32-53 is respectfully requested.

No fees are required under 37 C.F.R. 1.16(h)(i). However, if such fees are required, the Patent Office is hereby authorized to charge Deposit Account No. 08-2025.

The Examiner is invited to contact the Applicant's representative at the below-listed telephone numbers to facilitate prosecution of this application.

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Any inquiry regarding this Amendment and Response should be directed to either Patrick G. Billig at Telephone No. (612) 573-2003, Facsimile No. (612) 573-2005 or Kevin Hart at Telephone No. (970) 898-70577, Facsimile No. (970) 898-7247. In addition, all correspondence should continue to be directed to the following address::

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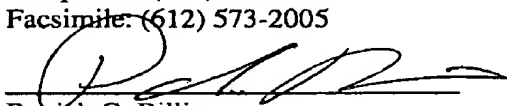
Respectfully submitted,

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CERTIFICATE UNDER 37 C.F.R. 1.8:

The undersigned hereby certifies that this paper or papers, as described herein, are being transmitted via facsimile to Facsimile No. (571) 273-8300 on this 8 day of December, 2006.

By: 

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